



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/SE88/00255 <b>(22) International Filing Date:</b> 18 May 1988 (18.05.88) <b>(31) Priority Application Number:</b> 8702057-4 <b>(32) Priority Date:</b> 18 May 1987 (18.05.87) <b>(33) Priority Country:</b> SE  <b>(71) Applicant (for all designated States except US):</b> SUNDSTRÖM SAFETY AB [SE/SE]; box 10056, S-181 10 Lidingö (SE). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only) :</b> SUN, Yeo, Chung [SE/SE]; Norrskensbacken 7, S-146 00 Tullinge (SE). <b>(74) Agent:</b> AWAPATENT AB; Box 45086, S-104 30 Stockholm (SE).		<b>(81) Designated States:</b> AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US.  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>
<b>(54) Title:</b> ARRANGEMENT IN PROTECTIVE MASK  <div data-bbox="425 1163 1237 1692"> </div> <b>(57) Abstract</b>  <p>An arrangement in protective masks comprising a face enclosing part with an opening (2) covered with a transparent material, a nosepiece (8) enclosing the wearer's mouth and nose, connections (3, 5) for means supplying clean air and for evacuation means, seal means (13, 15) engaging the wearer's head, and securing means engaging the back of the wearer's head. The protective mask comprises a rigid material helmet-like shell enclosing the front half of the wearer's head, having at its upper front portion said opening (2) and at its lower front portion the nosepiece (8), wherein the securing means comprise an arc-shaped securing flap (10) pivotably mounted on the upper rear portion of said shell (1), allowing the shell to be slipped on or off, and an arcuate visor-like clamping member (11) mounted at the back of the helmet-like shell securing for locking said flap.</p>		

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ARRANGEMENT IN PROTECTIVE MASK

The present invention relates to an arrangement in protective masks of the type stated in the claim.

More precisely, the invention relates to an arrangement in protective masks of the type which is used in order to protect the wearer from noxious gases and the like, the inhalation air being supplied, via a filter means, to the space inside the mask through a tube from premises in which the air contains no noxious substances, or from an air container carried by the user.

Prior art protective masks consist of a cup-shaped, soft facepiece usually made of rubber or a rubber-like material and having a sealing edge adapted to connect closely to the skin of the wearer's face. The facepiece is provided with adjustable elastic harness straps to hold the facepiece in the intended sealing position.

Such a mask is difficult to put on and take off, inter alia because the elastic straps pull the wearer's hair and are, like the mask as such, rough and chafe the skin. Because the edges of the mask abut the skin, the skin will be readily irritated, especially when working in warm rooms.

The object of the invention is to provide an arrangement which eliminates the drawbacks of prior art masks and gives a mask which is easily put on and taken off, is comfortable and reduces the feeling of being confined.

The characteristic features of the arrangement are stated in the appended claims.

One embodiment of the mask according to the invention will be described below, reference being had to the accompanying drawings in which:

Fig. 1 is an exploded view of the components of the mask;

Fig. 2 shows the assembled mask as seen obliquely

from in front;

Figs 3 and 4 are side views of the mask in its open slip-on and removal position and in its closed position, respectively;

5 Fig. 5 is a side view of the assembled mask;

Fig. 6 is a front view of the mask as shown in Fig. 5;

Fig. 7 illustrates the mask as shown in Fig. 5, but seen obliquely from below; and

10 Fig. 8 is a rear view of the mask shown in Fig. 5.

The main part of the mask is an open, helmet-like shell 1 which is open at the back and has an opening 2 for vision, covered with a transparent material and sufficiently wide so as not to obstruct vision in lateral  
15 direction. The lower front portion of the shell is equipped with a connection 3 for a filter unit or like connecting element 4 and, adjacent said connection, with outlet openings 5 for consumed air. On a level  
20 with the wearer's ears, there are holes 6 in which hearing protectors 7 are mounted, as will be described later on. Inside the lower front portion of the mask, a nose-piece 8 is mounted which encloses the wearer's mouth and nose.

The shell 1 is thus intended to enclose the chin  
25 portion, the face and the head except the back of the neck, and when the shell is in this position, the nose-piece 8 defines an inner space which connects with the wearer's mouth and nose, and a surrounding outer space.

An arm 9 extends from the upper portion of the  
30 shell 1, and a securing flap 10 is pivotably or displaceably mounted on said arm. An arcuate clamping member 11 is pivotably mounted at the upper edge of the shell rear portion.

As shown in Fig. 2, a succession of eyelets 12a  
35 and 12b, respectively, are arranged along the lower edge of the shell 1 and also on the arcuate clamping member 11. Figs 6, 7 and 8 show how sealing pads are

mounted inside the shell. Fig. 6 shows a pad 13 extending along the shell portion connecting with the wearer's forehead, while Fig. 7 shows how an elongate pad 15 with openings 14 matching the holes 6, extends from  
5 the portion adjacent one ear, downwardly along the cheek portion, inside the portion connecting with the chin and up to the portion adjacent the other ear. Fig. 8 shows that the pads 13 and 15 are in sealing engagement with each other to tightly seal across the forehead,  
10 along the cheeks and around the chin, thereby to shut off the outer space inside the mask. The pads have a core of elastic material and are coated with cloth or the like which closely follows the skin without irritating it.

15 The above-mentioned nosepiece 8 (Fig. 1) defining the inner space, is made of a soft material. In protective masks, the connection for filtered or similarly supplied, clean air is frequently arranged in such manner that the-clean air is blown into or enters the outer space  
20 to prevent misting of the eyepiece or the like. The incoming air causes an irritating draught across the eyes, and therefore the air inlet of the mask according to the embodiment described is arranged such that part of the air enters the inner space and another part enters  
25 the outer space. Further, the connecting element 4 for the air supply is provided with a sound-transmitting membrane or the like to permit verbal communication.

To obtain and maintain the seal established by the pads 13 and 15, the shell of the mask must be kept  
30 in a fixed position relative to the wearer's head.

The shell of the mask is fixed and secured by means of the securing flap 10 which is provided with an inner pad 16 of an elastic material. Figs 3, 5 and 7 illustrate how the securing flap 10 and the arcuate clamping member  
35 11 have been pivoted upwards so as to uncover the interior of the mask such that the mask can be slipped over the head from in front. Subsequently, the securing flap 10

mounted inside the shell. Fig. 6 shows a pad 13 extending along the shell portion connecting with the wearer's forehead, while Fig. 7 shows how an elongate pad 15 with openings 14 matching the holes 6, extends from the portion adjacent one ear, downwardly along the cheek portion, inside the portion connecting with the chin and up to the portion adjacent the other ear. Fig. 8 shows that the pads 13 and 15 are in sealing engagement with each other to tightly seal across the forehead, along the cheeks and around the chin, thereby to shut off the outer space inside the mask. The pads have a core of elastic material and are coated with cloth or the like which closely follows the skin without irritating it.

The above-mentioned nosepiece 8 (Fig. 1) defining the inner space, is made of a soft material. In protective masks, the connection for filtered or similarly supplied, clean air is frequently arranged in such manner that the clean air is blown into or enters the outer space to prevent misting of the eyepiece or the like. The incoming air causes an irritating draught across the eyes, and therefore the air inlet of the mask according to the embodiment described is arranged such that part of the air enters the inner space and another part enters the outer space. Further, the connecting element 4 for the air supply is provided with a sound-transmitting membrane or the like to permit verbal communication.

To obtain and maintain the seal established by the pads 13 and 15, the shell of the mask must be kept in a fixed position relative to the wearer's head.

The shell of the mask is fixed and secured by means of the securing flap 10 which is provided with an inner pad 16 of an elastic material. Figs 3, 5 and 7 illustrate how the securing flap 10 and the arcuate clamping member 11 have been pivoted upwards so as to uncover the interior of the mask such that the mask can be slipped over the head from in front. Subsequently, the securing flap 10

which can also be telescopingly arranged, is moved downwards so as to engage with the back of the wearer's neck, whereby the mask as such is pressed against the forehead, the cheeks and the chin to establish the intended seal. At the same time, the arcuate clamping member 11 is pivoted downwards as shown in Fig. 4, whereby it locks the flap 10 in a securing position. The points of pivotment 18 of the arcuate clamping member are positioned relative to the point of pivotment 17 of the flap 10 and the area of engagement thereof with the back of the neck, so as to cause a certain degree of self-locking. To additionally prevent the arcuate clamping member 11 from being inadvertently opened and thus the flap 10 from being released, a safety wire 19 is attached to the eyelets 12a adjacent the arcuate clamping member and is passed through the eyelets 12b at the lower edge of the shell 1. The free portion of the wire extends through a friction lock 20 under the chin portion of the shell 1. Having donned the mask, the wearer simply pulls the wire tight and thereby secures the mask.

To remove the mask, the arcuate clamping member 11 is pivoted upwards manually against the action of the friction lock, whereby the securing flap is free to pivot upwards, and the mask can be taken off. It is also possible to overcome the resistance in the arcuate clamping member and the friction lock by merely pulling the mask forwards, and to remove the mask in one motion, which is important when in panic. The opening for vision is covered with a curved portion 21 of high-transparency material which, when necessary, can be exchanged.

In the embodiment shown, the hearing protectors 7 consist of an inner disc 22 which is provided with a connecting pin having an opening, and a membrane is mounted adjacent the disc, which responds to and transmits sound through the pin opening to the interior of the mask. Over the disc and the membrane, a further disc is mounted which can be displaced preferably by turning.

In one position of the disc, sound waves from the outside reach the membrane. In the other position, the disc screens the membrane, and the sound is damped.

The mask according to the invention is adapted  
5 to be combined with a safety helmet designed for direct connection with the shell 1. The mask can also be supplemented with a hinged or similarly arranged protective visor of the type used in welding or like radiant-type operations.



## CLAIMS

1. An arrangement in protective masks comprising a part enclosing the wearer's face and provided with an opening (2) covered with a transparent material, a nosepiece (8) enclosing the wearer's mouth and nose, connections (3, 5) for means supplying clean or filtered air and for evacuation means, seal means (13, 15) for sealing between the mask and the wearer's head, and securing means enclosing the back of the wearer's head or the back of the neck, characterised in that said protective mask comprises a helmet-like shell (1) made of a substantially rigid material and adapted to substantially enclose the front half of the wearer's head, the upper front portion of said shell being provided with said opening (2) covered with the transparent material, while the nosepiece (8) is positioned in the lower front portion of said shell, and that said securing means comprise an arc-shaped securing flap (10) which is displaceably mounted on the upper rear portion of said helmet-like shell (1) and which, when pivoted upwards, allows said helmet-like shell to be slipped on from in front, but which in the securing position engages with the central back part of the wearer's head so as to secure and press said helmet-like shell against the front of the head, and that an arcuate clamping member (11) which is mounted like a visor at the back of said helmet-like shell, is, from an upwardly pivoted, inactive position, pivotable downwardly over said securing flap (10) so as to lock said flap in its securing position.

2. The arrangement as claimed in claim 1, characterised in that said arcuate clamping member (11) is mounted on said helmet-like shell so as to be pivoted away and release said securing flap (10), when said helmet-like shell is pushed forwards by a predetermined force.

3. The arrangement as claimed in claim 1, c h a r -  
a c t e r i s e d in that said seal means (13, 15)  
consist of pads of a soft cellular material, and that  
said pads are coated with cloth or the like.

5 4. The arrangement as claimed in claim 1, c h a r -  
a c t e r i s e d in that said connection for clean  
or filtered air is provided with openings inside said  
seal means defining the space in the nosepiece as well  
as in the space outside said seal means.

10 5. The arrangement as claimed in claim 1, c h a r -  
a c t e r i s e d in that said securing flap (10) is  
pivotably mounted on said helmet-like shell (1).

6. The arrangement as claimed in claim 1, c h a r -  
a c t e r i s e d in that said securing flap (10) com-  
15 prises telescoping elements attached to said helmet-like  
shell (1).

7. The arrangement as claimed in claim 1, c h a r -  
a c t e r i s e d in that a so-called safety wire ex-  
tending through guides (12a, 12b) at the edge of said  
20 helmet-like shell (1) and having a friction lock in  
front, is adapted to prevent said arcuate clamping member  
(11) from being inadvertently pivoted upwards.

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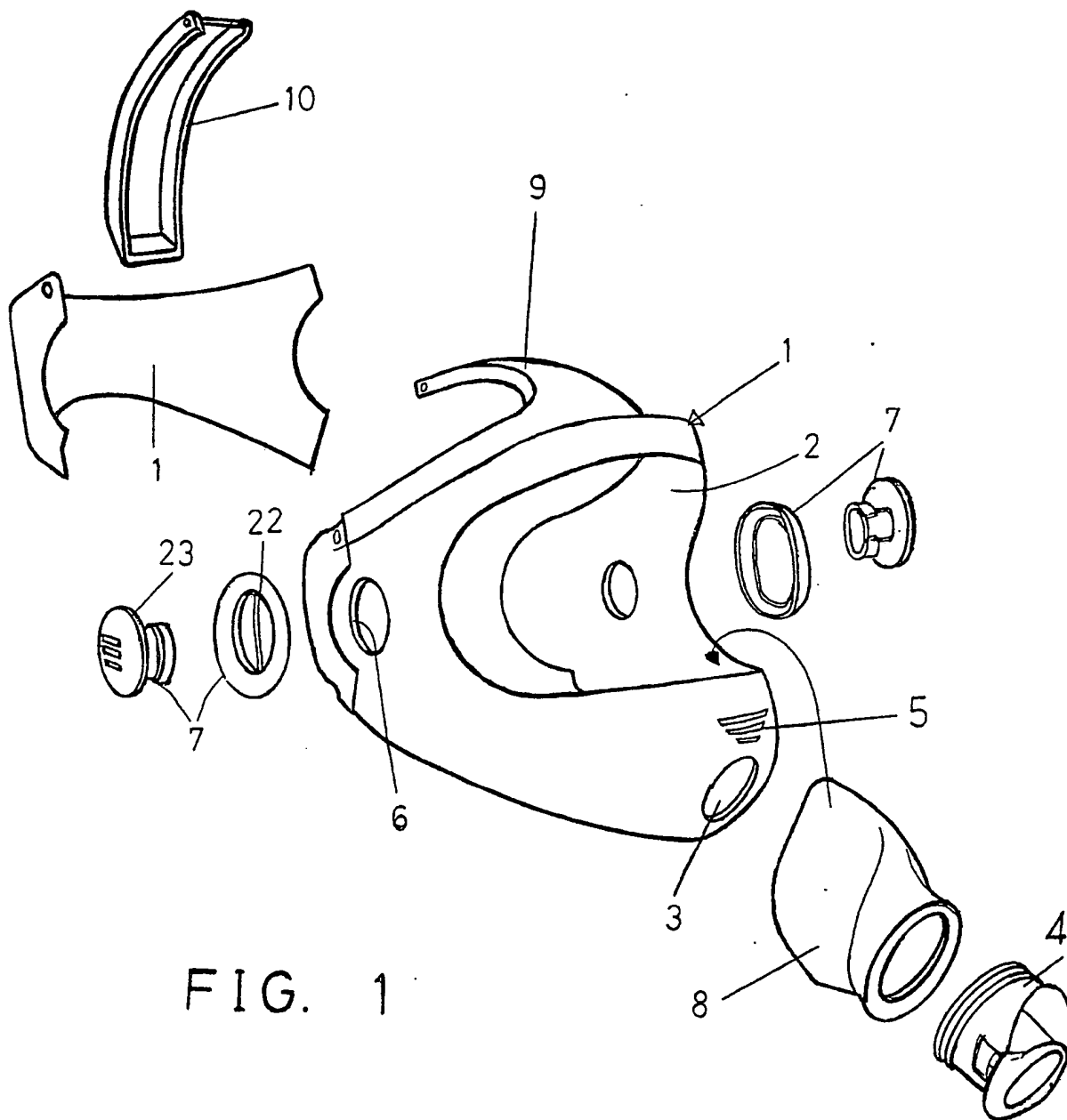
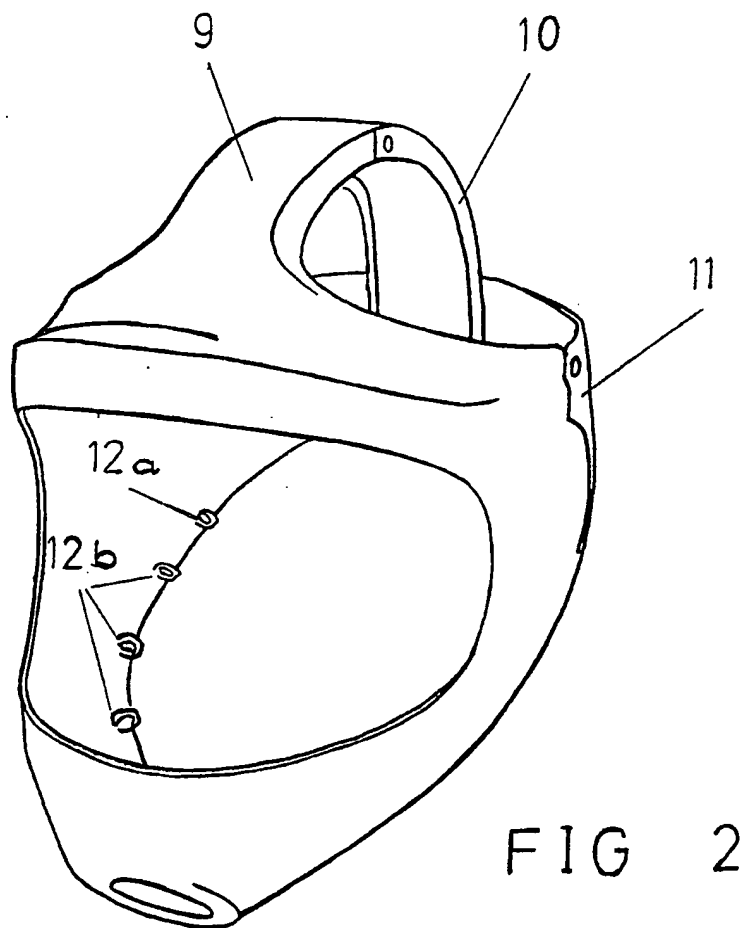


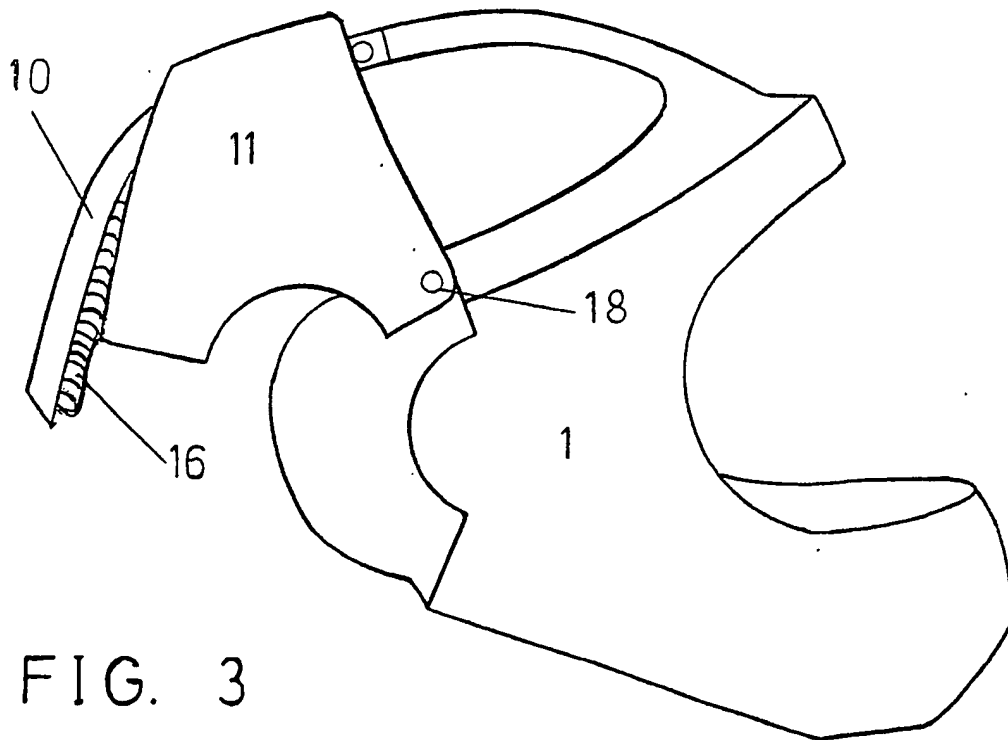
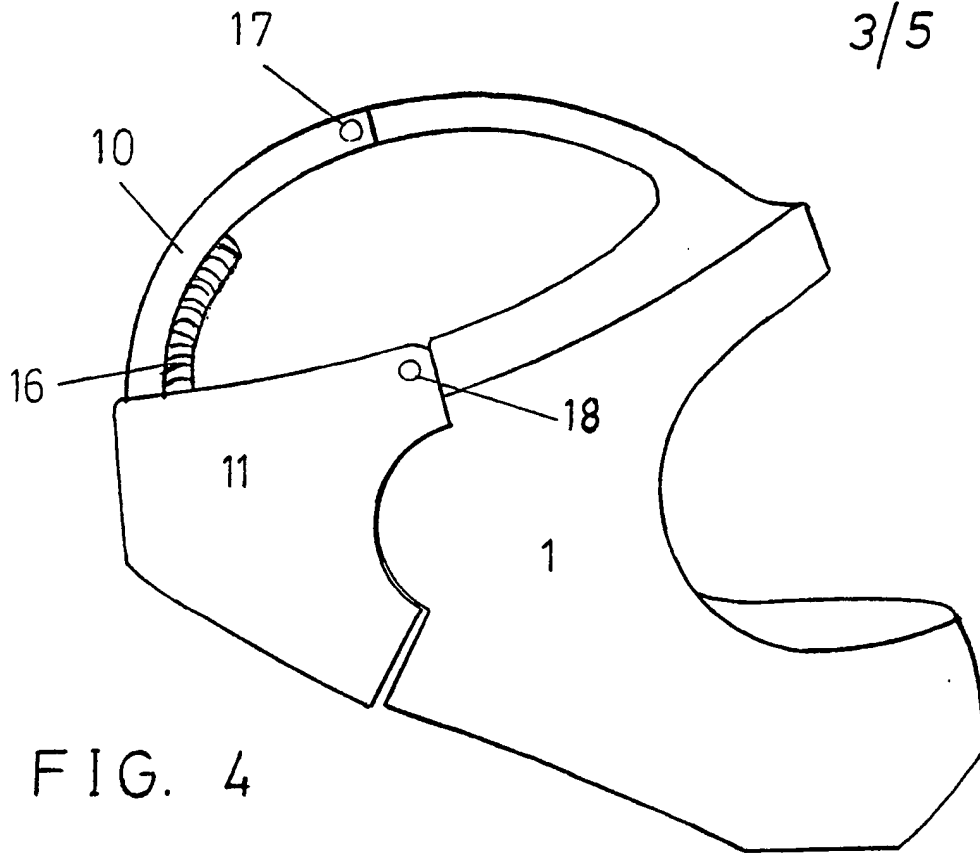
FIG. 1

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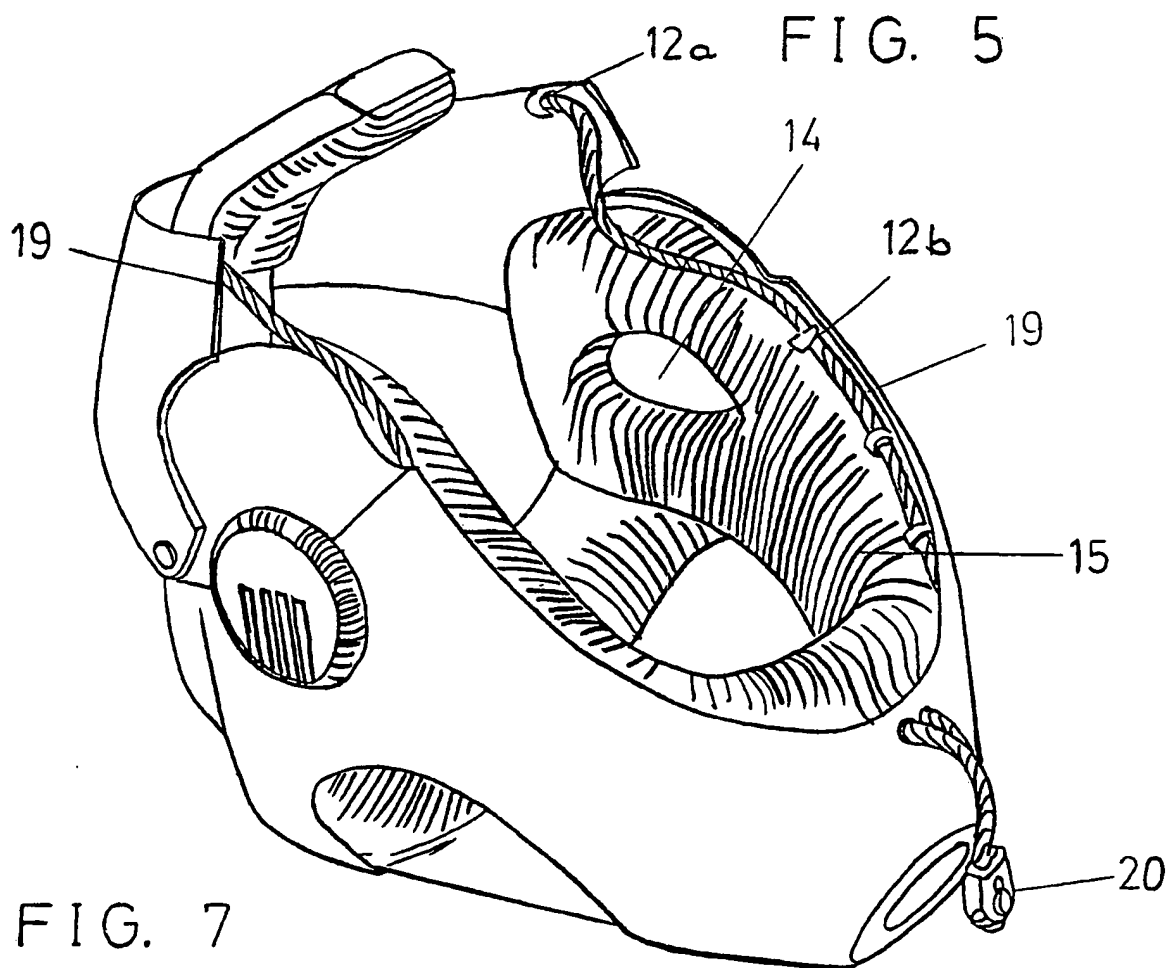
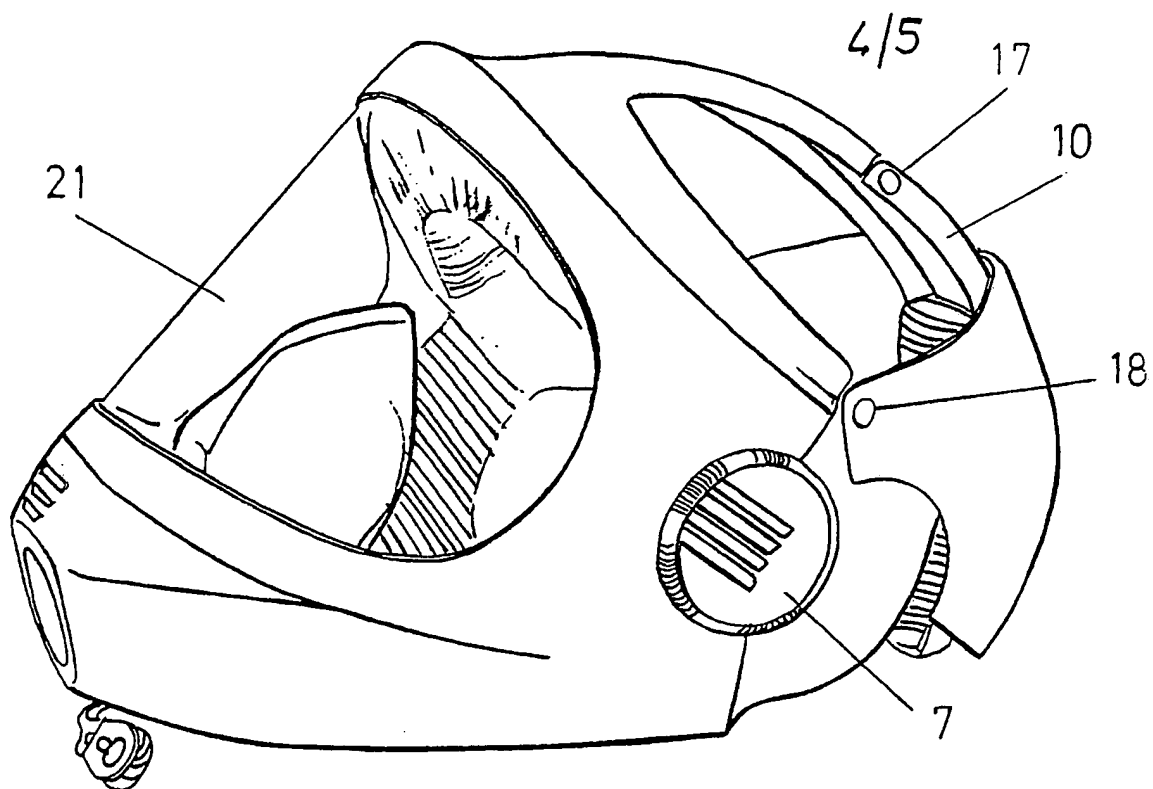


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**SUBSTITUTE SHEET**



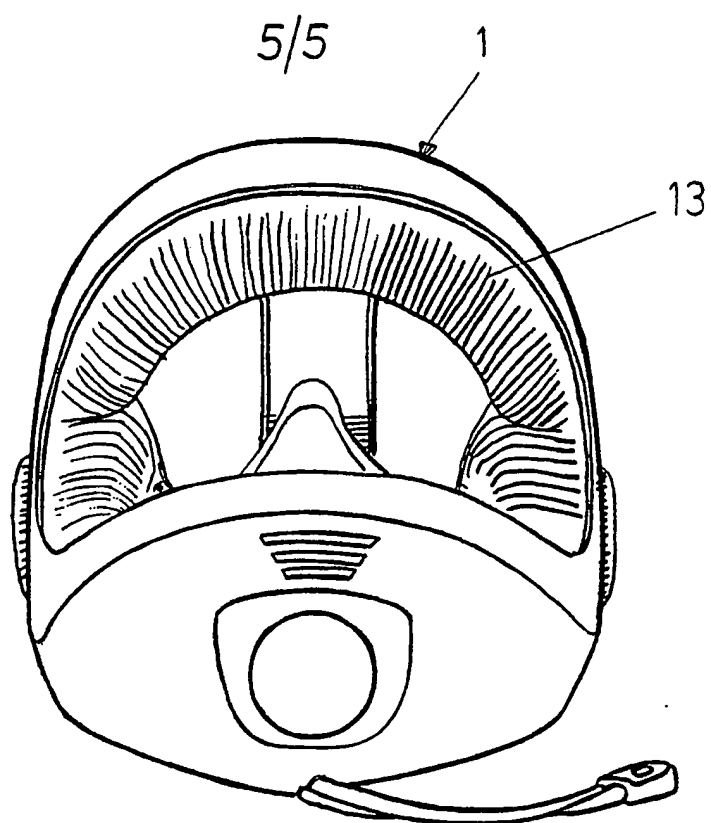
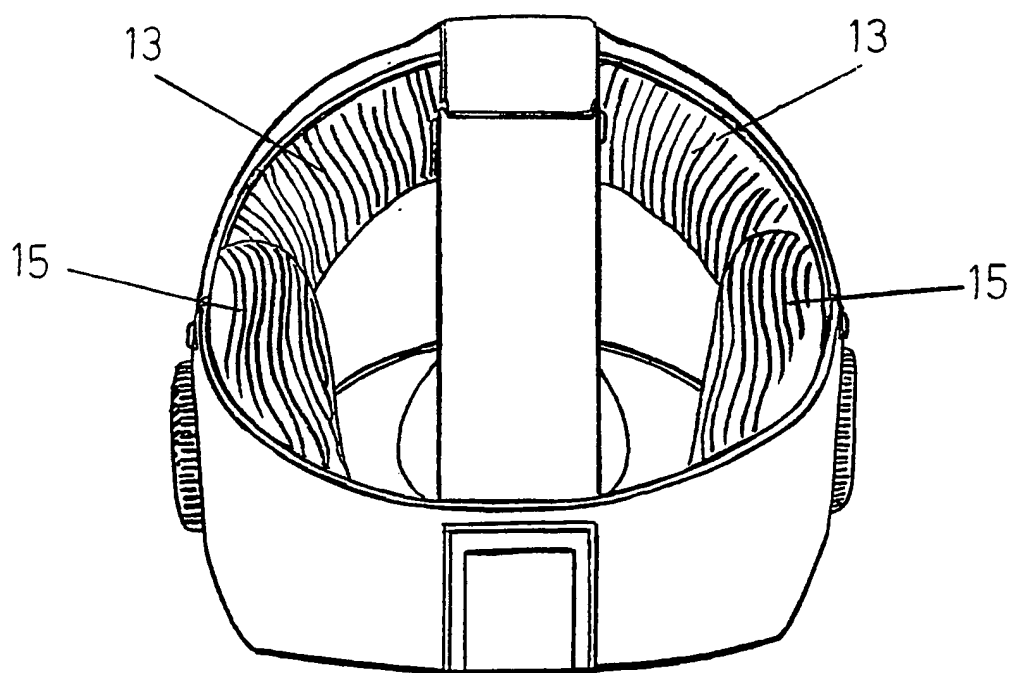


FIG. 6

FIG. 8



# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE88/00255

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) *		
According to International Patent Classification (IPC) or to both National Classification and IPC 4 <div style="text-align: center; margin-top: 10px;">A 62 B 18/02</div>		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched 7		
Classification System	Classification Symbols	
IPC 4	A 62 B 18/02, /04	
US C1	128:141, 142.5, 142.7, 201.24	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8		
SE, NO, DK, FI classes as above		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT 9</b>		
Category *	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No. 13
A	DE, A, 199 536 (ARMATUREN- UND MASCHINENFABRIK "WESTFALIA" AKT.-GES.) 12 June 1907	
A	DE, A, 1 279 473 (M L AVIATION COMPANY LIMITED) 1 October 1968	
A	FR, A, 1 319 517 (M L AVIATION COMPANY LIMITED) 21 January 1963	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: 10</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
1988-08-10	1988-08-11	
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Swedish Patent Office	 C. Westberg	